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EXAMINER	
TUCKER, WESLEY J	

ART UNIT	PAPER NUMBER
2624	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/090,746	OHISHI, SATORU	
	Examiner	Art Unit	
	WESLEY TUCKER	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 March 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed December 3rd 2008 has been entered and made of record.

2. Applicant has amended claims 1, 11, 16, 24, 29, 31, 32, 33, 34 and 35. New claims 36-45 have been added. Claim 2 is cancelled. Claims 1 and 3-45 are pending.

3. Applicant's remarks in view of the newly presented amendments have been fully considered but are not found to be persuasive for at least the following reasons:

Applicant argues of page 17 of the response that Nakajima has no description of estimating, transforming and displaying transforming images as recited in the independent claims. However, Applicant summarizes Nakajima to disclose each of these features on page 16 of the remarks. The discussion of each of the elements is included in the previous rejection and is repeated below. Nakajima clearly reads on the claimed elements as recited.

4. Applicant further argues that the newly added claim feature of displaying the image areas "***at a preset position on the display such that an operator is free from moving an eyepoint***" is not found to be distinguishing or limiting in scope in any significant. Nakajima discloses displaying multiple images with regions of interest that

are aligned and transformed fro display. These images are going to be displayed on a computer screen or monitor. The display position is interpreted as a preset as the monitor will display the image centered on the region of interest and furthermore an operator of such a computer display would not and does not need to move their eyepoint to see the region of interest in the image. In all practicality it is difficult o imagine a computer screen that would require the user to move their eyepoint. How big is the computer screen that requires such an inconvenience of moving one's eyepoint? From Nakajima's disclosure, the region of interest will be visible and centered on the display screen at a preset position because the aligned regions of interest must be aligned and therefore preset using center of gravity and the like.

5. With regard to the added feature of claim 1, "***wherein the plurality of images are acquired by rotation around an object to be examined***", this language is still very broad and reads reasonably broadly on the rotation correction taught by Nakajima. Nakajima teaches explicitly correction for rotated images (Figs. 7 and 8 for illustration). The object of interest is the region of interest in Nakajima. When the imager is rotated this is interpreted broadly as rotating around an object to be examined.

Similar discussion also applies to the added new claims 36-45. Each claim reads: "***wherein the transformation section calculates an amount of movement in each image based on an angle of rotation of an image pickup system for acquiring the plurality of images, and transforms the plurality of images based on the calculated amount of movement in each image***." Nakajima discloses this feature

(Figs. 7 and 8 and column 8, line 56 - column 9, line19). Nakajima teaches performing rotation correction for multiple images. The rotation between the images is interpreted as the calculated movement in each image. As the camera acquires the images at different angles, the rotation angles are then corrected for by the rotation affine transformation.

The Rejection in view of Nakajima is maintained and accordingly made FINAL.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3, 8, 16, 21, 29, 31, 33, 35-36, 38, 40-41, 43 and 45 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakajima et al. (hereafter, "Nakajima" (USPN 5,623,560).

With regard to claim 1 Nakajima discloses an X-ray diagnostic apparatus (Figure 3) comprising:

a memory which stores a plurality of images (col. 12 lines 24-26, col. 13 lines 48-50 and lines 60-65);

a designating section which designates a region of interest on at least one of the plurality of images on the basis of an input from an operator (col. 14 lines 14-20 and also seen in Figure 2);

a position estimating section which estimates corresponding areas, which correspond to the region of interest, on the remaining images of the plurality of images (position estimation by matching - correlating - at col. 14 lines 20-40; also at col. 16 line 62 to col. 17 lines 1-9);

a transformation section which transforms the plurality of images so as to locate the region of interest and the respective corresponding areas at substantially a same display position (transformation of the position points so that image SO2 points match with those of image SOI at col. 14 lines 41-65; also col. 20 lines 5-24); and

a display section which after transformation by said transformation section displays the transformed images with the region of interest and the respective corresponding areas at a preset position on the display (display apparatus 30 displays the transformed image as shown in Figures 7 and 8 and also at col. 18 lines 45-48).\

Nakajima clearly discloses this language as seen in Figs. 7 and 8. Nakajima discloses identifying regions of interest in two different images, aligning the regions of interest by transforming the images, and then displaying the images on top of each other with the region of interest aligned and displayed at the same area of the image and of the display. This is interpreted as a preset position on the display. The region of interest and corresponding areas are clearly in the same position in the displayed image. The area is interpreted as preset, because the region of interest is defined and located in order to align the second image to the specified region of interest.

With regard to claim 3 Nakajima discloses the corresponding region on each of the remaining images is determined on the basis of at least one of the designated region of interest (col. 14 lines 12-29).

With regard to claim 8 Nakajima discloses position estimation section that performs correlation value computation associated with pixel values in the region of interest between at least two adjacent images of the plurality of images, and obtains the corresponding areas on the respective remaining images on the basis of the correlation values (matching positions in each image, col. 14 lines 20-22).

Claim 16 recites identical features as claim I. Thus, arguments similar to that presented above for claim 1 is equally applicable to claim 16.

Claim 21 recites identical features as claim 8. Thus, arguments similar to that presented above for claim 8 is equally applicable to claim 21.

Claim 29 recites identical features as claim 1. Thus, arguments similar to that presented above for claim 1 is equally applicable to claim 29.

With regard to claim 31, the discussion of claim 1 applies. Nakajima discloses the claim features as discussed above. Applicant has added the additional language regarding observing the region of interest and the respective corresponding areas

without moving observers viewpoint. Nakajima discloses displaying the corresponding regions of interest in two different images aligned and on top of each other in figures 7 and 8. Clearly the observer's viewpoint or "eyepoint" does not change. The images are on top of each other. There is no need to move the user's viewpoint. The reference of Nakajima clearly reads on the new claim language. Claims 31-35 are accordingly rejected.

With regard to claim 33, the discussion of claims 1 and 16 apply.

With regard to claim 35, the discussion of claim 29 and 31 apply.

7. With regard to claims 31-35, these claims are addressed above with regard to the feature of observing the region of interest and corresponding areas without moving the observer's viewpoint.

With regard to claims 31-35 the discussions of claim 1, 11, 16, 24 and 29 apply respectively. Claims 31-35 repeat the limitations of claims 1, 11, 16, 24 and 29 respectively with the addition of the already discussed feature of observer's viewpoint. The primary reference to Nakajima discloses the newly added feature. Claims 31-35 are rejected accordingly.

NEW CLAIMS

8. With regard to new claims 36-45, Nakajima discloses the recited features. Each claim reads: "***wherein the transformation section calculates an amount of***

movement in each image based on an angle of rotation of an image pickup system for acquiring the plurality of images, and transforms the plurality of images based on the calculated amount of movement in each image." Nakajima discloses this feature (Figs. 7 and 8 and column 8, line 56 - column 9, line19). Nakajima teaches performing rotation correction for multiple images. The rotation between the images is interpreted as the calculated movement in each image. As the camera acquires the images at different angles, the rotation angles are then corrected for by the rotation affine transformation.

Claims 36, 38, 40-41, 43 and 45 are rejected under this section.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2, 9-10, 17, 22-23 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima in view of Sato et al. (hereinafter, "Sato") (USPN 5,640,462).

With regard to claim 2, Nakajima discloses plurality of images obtained from an object to be examined as disclosed above in claim 1 and the arguments are not

repeated herein, but are incorporated by reference. Nakajima does not expressly disclose plurality of images obtained by rotation around an object to be examined. Sato discloses this at Figs. 6 and 9. The rotational moving apparatus 19 is rotated in step 305 after each time an image is taken, so that an x-ray image may be taken at a different angle (col. 6 lines 64-55 and col. 8 lines 2-5). An image is taken and the rotational moving apparatus 19 is rotated until a predetermined number is satisfied (col. 7 line 5-7). Nakajima and Sato are combinable because they are from the same field of endeavor, i.e., medical image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the teaching of Sato with Nakajima. The motivation for doing so is that an x-ray image may be taken at a different angle (as suggested by Sato at col. 6 lines 64-55 and col. 8 lines 2-5). Therefore, it would have been obvious to combine Sato with Nakajima to obtain the invention as specified in claim 2.

With regard to claim 9 Sato discloses further comprising display range adjusting section which adjusts a display range of an X-ray diagnostic image after the shift processing by using a shutter having a predetermined shape (The translational range 8 is adjusted in step 304 by the driving control apparatus as determined by the ROI control apparatus 17 in step 303 (col. 6 lines 49-64). This adjustment is performed after the shift which is also performed in step 304. A pre-collimator 2 acts as a shutter to convert the x- ray 5 into a fan-beam x-ray 5 (col. 6 lines 55-56). The fan shape of the x-

ray beam 5 is the result of the pre- collimator having a predetermined shape.).

With regard to claim 10 Sato discloses the apparatus according to claim 9, wherein the predetermined shape can be set to an arbitrary shape (Sato discloses the predetermined shape of the collimator to produce a fan-shaped beam. However, Sato's use of the phrase "According to a consideration" (col. 3 line 30) suggests that this shape is used as an example only and could be any other shape.).

Claim 17 recites identical features as claim 2. Thus, arguments similar to that presented above for claim 2 is equally applicable to claim 17.

Claim 22 recites identical features as claim 9. Thus, arguments similar to that presented above for claim 9 is equally applicable to claim 22.

Claim 23 recites identical features as claim 10. Thus, arguments similar to that presented above for claim 10 is equally applicable to claim 23.

With regard to claim 30 Nakajima discloses plurality of images obtained from an object to be examined as disclosed above in claim I and 29 and the arguments are not repeated herein, but are incorporated by reference. Nakajima does not expressly disclose plural of the plurality of images stored in the memory. It would have been obvious matter of design choice to modify the Nakajima reference by having more than

one of the second image (template image) to compare with the first image (reference image) and it appears that the second image in Nakajima would perform equally well with the plurality of images to perform the transformation and display section (as disclosed in claim 1).

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima in view of Rougee et al. (hereinafter, "Rougee") (USPN 5,699,446).

With regards to Claim 4 Nakajima discloses the apparatus according to claim 1 having a position estimating section, but does not disclose the position estimating section to obtain and project a 3D position. However, Rougee discloses a method wherein when areas of interest are designated on at least two X-ray diagnostic images, said position estimating section obtains a 3D position of a diagnosis target on the basis of straight lines connecting focal positions of an X-ray source in sensing the respective images on which the areas of interest are designated and the areas of interest, and projects the 3D position onto the remaining images of the plurality of images, thereby estimating the respective corresponding areas (Fig. 2. The points 24 and 28 are the designated areas of interest on the x-ray images 20 and 21, taken at focal positions 18 and 19, respectively (col. 4 lines 50-56 and col. 5 lines 8-10). The lines 18-24 and 19-28, which connects the focal positions with their respective area of interests are used to compute the 3 D position of the diagnosis target (locus, 25) (col. 5 lines 17-21). The 2D positions of the area of interest are then displayed (col. 5 lines 28-31). This position is

projected on each of the rotational images (col. 6 lines 8-10)). It would be obvious to one of ordinary skill in the art to modify Nakajima's position estimating section to obtain a 3D position and project the position as taught by Rougee because Nakajima desires to only collect penetrating data through a region of interest (col. 14 lines 2-23). Furthermore, one would be motivated to make this modification because projecting the three dimensional point on the remaining images estimates the corresponding areas of interest thereby reducing the data collected and shortening the time needed to acquire the images.

11. Claim 5-7 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima in view of Chen et al. (hereinafter, "Chen") (USPN 6,047,080).

With regards to Claim 5 Nakajima discloses the apparatus according to claim 1 designating an area of interest, but does not disclose using a function of the designated areas on two images to obtain areas on the remaining images. However, Chen discloses a method of 3D reconstruction wherein when areas of interest are designated on not less than two X-ray diagnostic images, said position estimating section calculates a locus of the areas of interest in the moving image by using a function on the basis of the respective designated areas of interest, and obtains the corresponding areas on the remaining images on the basis of the locus (Figs. 1 and 4. The two images (V and V') containing areas of interest are acquired. These two views are used by a position estimating section 32 to establish the corresponding areas of interest or image features

(col. 10 lines 12-16). Several methods of estimating the areas of interest are disclosed depending on the degree of noise (col. 12 lines 9-1 I). These methods rely on various functions to calculate a locus of the areas of interest (Equations 3 and 4).). It would be obvious to one of ordinary skill in the art to modify Nakajima with Chen because Chen teaches the use of just two images for reconstructing 3D structures (col. 2 lines 42-44). Furthermore, one would be motivated to make this modification because Chen's method of calculating the corresponding areas of interest between those that are designated allows accurate 3D reconstruction in a shorter period of time because fewer images are needed. Chen's method allows the step size between rotations to be larger reducing the number of times an image is taken, which is a time consuming process.

With regards to Claim 6 Nakajima as modified by Chen disclose the apparatus according to claim 5, wherein said position estimating section includes an interface which switches the function by manual operation (Chen: The position estimating section 32 as explained in claim 5 has several available methods, such as a linear algorithm (col. 10 lines 41-46) and an objective function (col. 12 lines 9-18). It is understood from the use of the word "employ" that a user would choose which method would be implemented depending on the noise of the data.).

With regards to Claim 7 Nakajima as modified by Chen disclose the apparatus according to claim 5, wherein said position estimating section selects a function to be

used in accordance with the number of areas of interest designated by an operator (Chen: Equations 3 and 4 contain a variable n, which is representative of the number of areas of interest (points extracted) (col. 12 lines 30-31).).

Claim 18 recites identical features as claim 5. Thus, arguments similar to that presented above for claim 5 is equally applicable to claim 18.

Claim 19 recites identical features as claim 6. Thus, arguments similar to that presented above for claim 6 is equally applicable to claim 19.

Claim 20 recites identical features as claim 7. Thus, arguments similar to that presented above for claim 7 is equally applicable to claim 20.

12. Claims 11, 24, 32, 34, 37, 39, 42 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima in view of Slack (USPN 6,487,432).

With regard to claim 11 Nakajima discloses all of the limitations in claim 11 as disclosed above in claim 1 and the arguments are not repeated herein, but are incorporated by reference. Nakajima does not expressly disclose a memory for storing a 3D image or designating a region of interest on this 3D image. However Slack teaches

a method for selecting and displaying medical image data comprising: a memory which stores a plurality of 2D images forming a moving image of a predetermined diagnosis target when continuously displayed and a 3D image of the predetermined diagnosis target (Slack, Figs. 2 and 3. The archive subsystem 54 stores the plurality of 2D images acquired (col. 3 lines 4-5). The data acquisition system 32, which acquires the 2D images, sends the images to an image reconstructor 34, which creates a 3D image (col. 2 lines 44-49). This reconstructed 3D image is then stored in a memory 38 (col. 2 lines 49-51).); and a designating section which allows an operator to designate a region of interest on the 3D image (Slack, Fig. 4. The operator uses the reconstructed 3D image 104 to identify or designate a region of interest.). It would have been obvious to one of ordinary skill in the art to combine these references because Slack teaches the location of a region of interest from a large amount of image data (col. 1 lines 46-51). Also one would have been motivated to make this combination to simplify the diagnosis process, since irrelevant data has been excluded, thereby shortening the time needed to make a diagnosis.

Claim 24 recites identical features as claim 11. Thus, arguments similar to that presented above for claim 11 is equally applicable to claim 24.

With regard to claim 32, the discussions of claims 11 and claim 31 both apply.

With regard to claim 34, the discussions of claims 24, 11 and 31 apply.

With regard to new claims 36-45, Nakajima discloses the recited features. Each claim reads: "***wherein the transformation section calculates an amount of movement in each image based on an angle of rotation of an image pickup system for acquiring the plurality of images, and transforms the plurality of images based on the calculated amount of movement in each image***." Nakajima discloses this feature (Figs. 7 and 8 and column 8, line 56 - column 9, line19). Nakajima teaches performing rotation correction for multiple images. The rotation between the images is interpreted as the calculated movement in each image. As the camera acquires the images at different angles, the rotation angles are then corrected for by the rotation affine transformation.

Claims 37, 39, 42 and 44 are rejected under this section.

13. Claims 12-15 and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima in view of Slack as applied to claim 11 above, and further in view of Sato et al. (hereinafter, "Sato") (USPN 5,640,462).

Claim 12 recites identical features as claim 2. Thus, arguments similar to that presented above for claim 2 is equally applicable to claim 12.

Claim 13 recites identical features as claim 3. Thus, arguments similar to that presented above for claim 3 is equally applicable to claim 13.

Claim 14 recites identical features as claim 9. Thus, arguments similar to that presented above for claim 9 is equally applicable to claim 14.

Claim 15 recites identical features as claim 10. Thus, arguments similar to that presented above for claim 10 is equally applicable to claim 15.

Claim 25 recites identical features as claim 12. Thus, arguments similar to that presented above for claim 12 is equally applicable to claim 25.

Claim 26 recites identical features as claim 13. Thus, arguments similar to that presented above for claim 13 is equally applicable to claim 26.

Claim 27 recites identical features as claim 14. Thus, arguments similar to that presented above for claim 14 is equally applicable to claim 27.

Claim 28 recites identical features as claim 15. Thus, arguments similar to that presented above for claim 15 is equally applicable to claim 28.

FINAL REJECTION

14. Applicant's amendment necessitated the grounds of rejection presented in the Office Action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WESLEY TUCKER whose telephone number is (571)272-7427. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Bella can be reached on 571-272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Wes Tucker/
Examiner, Art Unit 2624